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Effect of Collisions on the Form of Stimulated Photon Echo in a Gas

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Abstract

© 2015 Springer Science+Business Media New York The spectral diffusion and time–frequency correlation of an inhomogeneously (Doppler) broadened line in a gas with velocity-changing collisions of particles in addition to the impact of spectral diffusion on the formation of stimulated photon echo (SPE) were investigated. It was shown that the frequency shift of the resonance transition of the gas atoms varied randomly with every velocity-changing collision of the atom. This led to uncorrelated inhomogeneous broadening in the gas at different time points and to a partial loss of the phase memory affecting the photon echo formation. This resulted in a distortion of the SPE temporal shape and; correspondingly, of the reproducibility of the information encoded in the temporal shape of a nonresident laser pulse.

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Keywords

inhomogeneously broadened line, spectral diffusion, stimulated photon echo, time–frequency correlation